Name _____

Chi-Square Practice

1. A poker-dealing machine is supposed to deal cards at random, as if from an infinite deck. In a test, you counted 1600 cards, and observed the following:

404 Spades 420 Hearts 400 Diamonds 376 Clubs

Is it equally likely to get a card from any of the 4 suits? Or are these discrepancies too much to be random?

- Write your null hypothesis
  -
    -
- Write your alternative hypothesis
  -
    -
- Formalize your thinking by making a contingency box

- Calculate your chi-square value
  - Show your work:

$$\chi^2 = \sum \frac{(\text{Observed Value} - \text{Expected Value})^2}{(\text{Expected Value})}$$

  - Chi-square value =
- Determine the critical chi-square value (use a p-value of 0.05)

p value	Degrees of Freedom							
	1	2	3	4	5	6	7	8
0.05	3.84	5.99	7.82	9.49	11.07	12.59	14.07	15.51
0.01	6.64	9.21	11.34	13.28	15.09	16.81	48.48	20.09

  - Degrees of freedom =
  - Critical chi-square value =
- Draw your conclusion
  - Our calculated chi-square value is _____ than our critical chi-square value
  - Therefore, we _____ our null hypothesis which means
    -
    -

2. One study of grand juries in Alameda County, California, compared the demographic characteristics of jurors with the general population, to see if jury panels were representative. The results for age are shown below. The investigators wanted to know if the 66 jurors were selected at random from the population of Alameda County. (Only persons over 21 and over are considered; the county age distribution is known from Public Health Department data.) The study was published in the UCLA Law Review.

Age	County-wide %	# of jurors expected	# of jurors observed
21-40	42%		5
41-50	23%		9
51-60	16%		19
over 60	19%		33
Total	100%		66

Do we have evidence that grand juries are selected at random for this population?

- Write your null hypothesis
  -
    -
- Write your alternative hypothesis
  -
    -
- Formalize your thinking by making a contingency box

- Calculate your chi-square value
  - Show your work:
  - Chi-square value =
- Determine the critical chi-square value (use a p-value of 0.05)
  - Degrees of freedom =
  - Critical chi-square value =
- Draw your conclusion
  - Our calculated chi-square value is _____ than our critical chi-square value
  - Therefore, we _____ our null hypothesis which means
    -

3. In a study of the effectiveness of an antipsychotic drug, patients treated with the drug were compared to patients receiving a placebo. In terms of the number relapsing,

- 698 of 1,068 patients relapsed after taking the placebo
- 639 out of 2,127 patients relapsed after taking the antipsychotic drug

Test the prediction that the antipsychotic is significantly more effective in preventing relapses than the placebo.

- Write your null hypothesis
  -
    -
- Write your alternative hypothesis
  -
    -
- Formalize your thinking by making a contingency box
  - Use antipsychotic drug numbers as observed results
  - To calculate expected results:
    - Determine the percentage of patients who did vs did not relapse in the control group (placebo)

    - Multiply the percentages by the total number of patients being treated with the antipsychotic drug
- Calculate your chi-square value
  - Show your work:
  - Chi-square value =
- Determine the critical chi-square value (use a p-value of 0.01 this time)
  - Degrees of freedom =
  - Critical chi-square value =
- Draw your conclusion
  - Our calculated chi-square value is _____ than our critical chi-square value
  - Therefore, we _____ our null hypothesis which means
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